

as also in the numerous phenomena of amœboid ingestion in higher Metazoa.

The discussion of the origin of the Porifera and their relationship to the Choanoflagellata on the one hand, and to the Cnidaria on the other, must be left to specialists in this group; but the facts shown above certainly seem to have a direct bearing upon this difficult question. The fact that the inner layer cells assume mastigopod and myxopod stages under different physiological conditions strengthens the resemblance between the simpler sponges and the colonial Choanoflagellata, and the absence of *intercellular* digestion (with the morphological differences necessarily correlated to this) points to a fundamental difference between the former and the Cnidaria.

*List of Works referred to.*

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- (3) Y. DELAGE.—“Sur le développement des Éponges,” C. R. Assoc. Fr. Sci. 1890-91.
- (4) A. DENDY.—“Anatomy of *Grantia labyrinthica*,” Quart. Journ. Micr. Sci. xxxii.
- (5) H. E. DURHAM.—“Migration of Amœboid Corpuscles in *Asterias*,” Trans. Roy. Soc. 1887.
- (6) E. HÆCKEL.—‘Die Kalkschwämme.’
- (7) HEIDER.—Abh. Zool. Inst. Wien, vi.
- (8) LIEBERKÜHN.—“Beiträge zur Entwicklungsgeschichte der Spongillen,” Müller’s Archiv, 1856.
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- (12) A. RUFFER.—“Immunity against Microbes,” Quart. Journ. Micr. Sci. xxxii.
- (13) A. SEDGWICK.—“Development of *Peripatus*,” Quart. Journ. Micr. Sci. xxvii.
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LV.—*Descriptions of Eight new Species of Butterflies from New Britain and Duke of York Islands, in the Collections of the Hon. Walter Rothschild and Mr. Grose Smith, captured by Captains Cayley Webster and Cotton.* By H. GROSE SMITH.

*Papilio Websteri.*

*Male.*—*Upperside.* Both wings black. Anterior wings with a curved row of six white spots between the veins towards the apex, the first above the costal nervure narrowly

linear, the second and fourth the largest, the latter being concave on its outer edge, the third and fifth smaller, the sixth the smallest; the apex beyond this row is dusted with a few grey scales, and there are rays of grey scales in the cell. Posterior wings with a large greenish-white patch across the disk and the outer fourth of the cell, that part which lies above the upper subcostal nervule not extending inwardly towards the base, as in other species of this group; the outer edge of the white patch is emarginate and somewhat concave between the veins. Incisions in both wings narrowly white.

*Underside.* Anterior wings brown-black, with the curved row of spots towards the apex as on the upperside, but larger, between which and the apex is a series of rays of greyish-brown scales between the veins. Posterior wings black, with a submarginal row of seven rufous-brown spots, crossing the wings from below the costa to the anal angle, the first, sixth, and seventh spots being the largest; inside the row of spots are a few patches of blue scales, those towards the anal angle being the most conspicuous. Incisions on the posterior wings broader and more conspicuous than on the upperside.

*Female.*—Both wings dusky brownish grey, dusted with brown scales. Anterior wings crossed from the costa, a little beyond its middle, to near the outer angle by a curved row of white spots, dusted on each side with grey scales and divided by the veins, those at the end of the cell, which they slightly invade, the most elongate, thence gradually diminishing towards the outer angle. Posterior wings with a large white patch, the upper part of which is bounded by the upper subcostal nervule, crossing the outer third of the cell and extending downwards along the submedian nervure, with some grey scales between that nervure and the inner margin, the outer edge of the white patch radiates between the veins and is clearly defined; a rufous subquadrate spot above the anal angle, followed by another between the two lowest median nervules. Incisions narrowly white.

*Underside* as above. On the anterior wings the curved row of white spots is more distinct and invades the end of the cell, which is broadly and irregularly marked with black. On the posterior wings the white patch extends nearly to the inner margin, there is a submarginal row of rufous bars between the veins, the spot above the anal angle is larger than on the upperside, and there are clusters of blue scales in the interspaces of the median nervules outside the white patch. Incisions more broadly white than on the upperside.

Expanse of wings, ♂ 4, ♀ 4 $\frac{3}{4}$  inches.

*Hab.* New Britain.

Belongs to the group of *P. ormenus*, Guér., and other allied species. The male differs from them principally in having the row of spots towards the apex of the anterior wings curved, less oblique, and further from the apex, and on the posterior wings in the upper part of the white patch on the upperside not extending inwardly along the costa towards the base. The female differs in having the curved row of white spots which crosses the anterior wings much more restricted, the patch on the posterior wings being pure white, wider, and more clearly defined.

*Vadebra eboraci.*

*Male.*—*Upperside.* Anterior wings velvety brown, with a submarginal row of four indistinct bluish-white spots between the veins towards the apex (absent in some specimens, nearly obsolete in others). Posterior wings with the outer two thirds the same colour, the inner third, including the upper part of the cell and the space between the upper median nervule and the costal margin, paler dull brown; one or two indistinct submarginal spots between the veins towards the apex (absent in some specimens).

*Underside.* Both wings more rufous velvety brown than on the upperside. Anterior wings with a dull streak dusted outwardly with a few whitish scales above the submedian nervure from the base to two thirds of its length, the space below that nervure to the inner margin whitish grey; a small spot in the cell, three or four spots beyond it, situate vertically below each other, of which the first and third are the largest and roundest, and a submarginal row of seven spots following the contour of the outer margin, curved rather sharply towards the apex and costal margin. Posterior wings with a large spot towards the end of the cell and a curved row of seven similar spots beyond it; a submarginal row of seven spots between the veins, the spot above the first subcostal nervule the largest, the others smaller and gradually decreasing in size; three or four minute spots a little before the outer margin, towards the apex; the spots on both wings bluish white.

The *female* resembles the male, but is rather paler on the upperside, with two spots between the veins towards the apex of the posterior wings; on the underside of the anterior wings the dull streak above the submedian nervure of the male is represented by a conspicuous pinkish-grey patch.

Expanse of wings 3 inches.

*Hab.* New Britain and Duke of York Islands.

*Vadebra lacon.*

*Male.*—*Upperside* darker velvety brown than in *V. eboraci*, and with the anterior wings suffused with purple; on those wings are two small purple spots near the apex between the veins, and two minute submarginal spots between the median nervules. Posterior wings with the costal and outer marginal area paler brown, with two small purplish-white spots between the veins towards the apex.

*Underside.* Both wings paler dull brown. Anterior wings with a spot near the end of the cell; a row of five spots crossing the disk beyond the cell, the two uppermost elongate and curving inwardly, the third nearly obsolete, the fourth larger and round, the fifth triangular with the apex pointing inwardly, two or three very minute submarginal spots between the median nervules and two larger spots near the apex; a very narrow pale streak below the third median nervule; the space below the submedian nervule in the middle is greyish. On the posterior wings is a spot near the end of the cell; a row of five spots surrounding the cell, two spots towards the apex, as on the upperside, and a row of small spots between the veins a little before the outer margin, two spots in each interspace; all the spots pinkish blue-white.

The *female* resembles the male on the *upperside* of both wings, but is rather paler; on the posterior wings are three subapical round spots whiter than the two spots in the male.

On the *underside* all the spots and markings are larger than on the upperside.

Expanse of wings, ♂  $2\frac{3}{8}$ , ♀  $2\frac{2}{8}$  inches.

*Hab.* New Britain.

*Mynes Cottonis.*

*Male.*—*Upperside* resembles *M. eucosmetos*, Godm. & Salv., but the pale area is purer white. On the anterior wings the pale patch towards the apex is less conspicuous, being scarcely visible. On the posterior wings the pale area is more restricted, the outer third of the wings being more broadly and more bluish black.

*Underside.* The subapical pale patch is pure white, not tinged with yellow as in *M. eucosmetos*, and is considerably narrower; the pale area in the middle of the wings is also pure white, but more extended, and the red submarginal spot between the upper median nervules is much smaller. On the posterior wings the red costal band at the base of *M. eucosmetos* is extended uninterruptedly into the interspace between

the costal nervure and the upper subcostal nervule, and extends over it towards the apex until it joins the dark outer-marginal band; the outer three fourths of the costal margin is broadly black, the basal fourth being red, below which is a large black patch at the base, as in *M. eucosmetos*, which extends over the basal part of the cell and of the interspace above it; the outer third of the wings is blue-black, in which, between the median nervules and submedian nervure, are situate three greenish-yellow patches and a series of sub-marginal pale streaks.

Expanse of wings  $2\frac{1}{4}$  inches.

*Hab.* New Britain.

One male, in the collection of Mr. Grose Smith.

*Mycalasis maura.*

*Male.*—*Upperside.* Both wings resemble *M. athiops*, Butl., but the zone round the ocellus on the anterior wings is rather brighter fulvous and the pale space under it is more conspicuous. On the posterior wings the disk is crossed by a row of four ocelli, of which the first and fourth are the smallest and the third is much the largest, the fulvous zones round the ocelli being very bright and wider than in *M. athiops*, the two middle zones being confluent, and each of the zones surrounded by a narrow dusky ring; the space outside the ocelli to the outer margin is pale olivaceous buff-colour, in which are situate two undulated lines, the inner of which is broader than the outer; a dark streak crosses the disk between the end of the cell and the ocelli.

*Underside* with the outer third of both wings much paler than in *M. athiops*, the outer edge of the dark basal portion of the wings being more undulated and tinged with rufous brown; both wings crossed before the middle by undulated rufous-brown lines; the space in which the ocelli are situate on the posterior wings is much paler buff and the zones round the ocelli are brighter than in *M. athiops*.

The *female* on the upperside resembles the male, but the ocelli are much larger and the fulvous zones round them are paler and broader, the number of the ocelli on the posterior wings being increased to six. On the underside the pale space in which the ocelli are situate is broader and whiter than in the male.

Expanse of wings, ♂  $1\frac{7}{8}$ , ♀ 2 inches.

*Hab.* New Britain.

Very close to *M. athiops*; the spots on the underside of the posterior wings are arranged somewhat differently and more regularly.

*Mycalesis matho.*

*Male*.—*Upperside* resembles *M. terminus*, Fabr., but differs as follows:—Both wings are shorter and rounder, the basal half of the anterior wings darker and more rufous; the space in which the discal ocellus is placed is paler and the ocellus is much larger; the space beyond the ocellus to the outer margin is paler and is traversed by a narrow dark line. The posterior wings are darker rufous brown and the two middle ocelli are larger.

On the *underside* the ocelli on both wings are larger and the outer third of the wings is paler; the inner two thirds is crossed in the middle by two undulated brown lines, of which those on the posterior wings are the more distinct.

The *female* resembles the male, the pale fulvous area in which the large ocellus on the anterior wings is placed being clearly defined.

Expanse of wings  $1\frac{1}{2}$  inch.

*Hab.* New Britain.

Near to *M. terminus*, Fabr., and *M. remulia*, Cram. This species had been previously sent to me by the Rev. Mr. Rickard in some numbers.

*Epimastidia albo-cærulea.*

*Male*.—*Upperside* brilliant cærulean blue, with the outer margins of both wings black. Posterior wings with the costal third greyish black.

*Underside* white, with the outer margins of both wings broadly dull black, centred with velvety-black lunules, bordered inwardly with bright blue lunules and outwardly with conical bright blue spots, towards the base of which are situate a series of velvety-black bars, almost covering the outer edge of the blue spots, which is only indistinctly seen.

Expanse of wings  $1\frac{3}{4}$  inch.

*Hab.* New Britain.

Very near *E. arienis*, Druce, from the Solomon Islands, but more brilliant blue on the upperside, and on the underside the outer dark margins, in which the blue lunules and spots are very brightly distinguished, are broader and blacker.

*Thysonotis esme.*

*Male*.—*Upperside* resembles *T. cepheis*, Druce.

*Underside*. Both wings more cinereous grey, with the pale spaces on them more cinereous white. On the anterior wings the pale space does not extend quite so far over the



disk towards the outer margin. On the posterior wings the metallic colouring at the base of both wings and in the discal band across the posterior wings is more bluish and less golden green, while the black velvety spots in the band are more extended inwardly; the outer edge of the band is further from the outer margin and more convex between the veins. Both wings are broader and more rounded at the apex.

Expanse of wings  $1\frac{3}{4}$  inch.

*Hab.* New Britain.

LVI.—*Observations on the Derivation and Homologies of some Articulates.* By JAMES D. DANA \*.

THE term Articulates is used here in preference to Arthropods, because the latter group is believed to be not a natural one, Crustaceans and Insects being less closely related to one another, as indicated beyond, than Annelids and Insects.

*Derivation of Limuloids and Crustaceans.*—As has been suggested by Lankester, it is probable that all the Articulates are successional to the Rotifers. There is reason for believing further that the types of Annelids, Crustaceans, and probably that of Limuloids had their independent Rotifer origin.

The Nauplius, or larval form of a Crustacean, shows, by its having but three pairs of limbs (two besides an antennary pair), that the type is not successional to a many-jointed Annelid, but rather to some *Pedalion*-like Rotifer. The discoveries of Prof. C. E. Beecher announced in the preceding and earlier numbers of this 'Journal' leave no doubt that the Trilobites are multiply Isopod Crustaceans, precursors of the normal Isopods, as the true Phyllopoets, also multiply species, were precursors of the Decapods †.

The Eurypterids, the early form of the Limuloids, are related to Crustaceans in number of body-segments, it being 19, as in the Tetradeapods, and in the fact that 13 of these 19 segments pertain to the thorax and abdomen. But the wide distinction exists that the Eurypterids have no thoracic or

\* From the 'American Journal of Science,' May 1894, pp. 325-329.

† In the Author's 'Report on the Crustacea of the Wilkes Exploring Expedition,' the Rotifers are made the lowest subdivisions of Crustacea (p. 1408), and the Trilobites are placed, with a query, in the subdivision of Tetradeapods, as multiply forms under the type. In the text above the expression *true Phyllopoets* is used, because most of the so-called Phyllopoets of the Palæozoic exhibit, in the specimens, no evidence that they are multiply, that is, have an excessive or abnormal number of body-segments or appendages.